

# Safety - Waste Disposal

Those Eligible  
To Read the  
Attached

To **Whitker**

**Dr. R. S. Stone**

Name B. S. Kim Date Sept 2

[illegible]

David R. Harwin 4/24/95  
Technical Information Officer Date  
ORNL Site

September 2, 1944

M. D. Whitaker

W. Q. Smith

General Background on Waste Disposal

At your request, I have collected the following information which covers chronologically the various steps taken in disposing of the wastes from the Separations Plant.

The Clinton Separations Plant was initially designed for the Lanthanum Fluoride Process and on this basis, sufficient storage capacity was provided to store all wastes for a period of one year. In June 1943, it was decided that the Bismuth Phosphate Process was the one preferred for operation at Hanford, and consequently it was decided that this process would be the first piloted at Clinton. It was recognized that the neutralized waste volume from the bismuth phosphate process was almost double that for the fluoride process and that storage capacity corresponded to about six months of operation.

Following the decision to use the phosphate process, the only modifications made in the plant were those which were required and every effort was made to hold these changes to a minimum in order not to delay start-up of the plant. At this time, the construction of the buried waste storage tanks was well under way and since they were one of the late items on the completion list, it was planned to start operations without further increase. It was realized that considerable decontamination of the chemical wastes would result from the precipitation of solids formed on neutralization and that if this were sufficient, it might be possible to dispose of the supernatant from the chemical wastes, thus increasing the life of the installed tanks to well over a year. If it developed that the supernatant could not be disposed of, then a number of months would be available for increasing the storage capacity or for installing equipment for further treatment of the supernatant.

In February 1944, approximately two months after beginning operation of the Separations Plant, analyses were run on the supernatant in the waste tanks which indicated that dilution with the available plant waste water to below tolerance levels would allow disposal of waste at the rate of input into the tanks.

Discharge of the supernatant from the waste tanks was started on March 6, 1944. Samples were taken of each pond before discharge to the creek in order to ensure that a body submerged in the water would not obtain more than .1 r in 24 hours. A few days after discharge of the waste started, it was observed that a precipitate was collecting in the ponds and that a large fraction of it washed into White Oak Creek when the pond valves were opened. On March 15 a sample of the slurry from the bottom of the ponds was found to contain 27,300 beta and 900 gamma counts per 5 cc, while the supernatant from the slurry

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contained 410 beta counts. The following day another sample of this precipitate taken from the exit ditch from the pond showed 32,500 beta counts/5 cc, while the supernatant from this sample gave only 75 beta counts. Thus the precipitate was carrying a large fraction of the activity from the waste. It was observed at this time that this precipitate was carrying into White Oak Creek and down the creek a ways. On the same day samples of water dipped out of the creek gave the following counts (5 cc); Before first rap: 8 betas; lagoon just beyond this gap: 7 betas; and exit of the dike below lagoon: 4 betas.

Recognizing that the precipitate formed was likely due to the calcium in the water, laboratory tests were carried out on March 18-25 which demonstrated that the addition of calcium chloride to the waste tanks would decontaminate the wastes by a factor of about 10. On about March 25, P. B. Vaughan discussed with W. C. Kay the advisability of adding calcium chloride daily to W-5 but was told not to do anything on this until the matter had been discussed further. Approval was obtained about two weeks later and so steps were then taken to install an air line to provide agitation in the tank. The addition of calcium chloride was started on April 17 and continued until the discharge to the ponds was discontinued on April 27. This treatment decreased the activity in W-5 by a factor of about 2, and was just beginning to take effect on W-6 when the discharge was discontinued.

About April 24, 1944 a more complete survey of White Oak Creek was made by Overstreet and Jacobson, the results of which have been widely publicized. On April 27 discharge of the waste was discontinued on the basis that if the activity found in the creek bed were of a species which was rapidly absorbed in the body or was one which had a long half-life, then continued discharge into creek might create a hazard. The elements responsible for the activity in the mud were not known nor were tolerance limits for the possible elements available.

Steps were immediately taken to provide a settling basin which would capture the solids formed on dilution and thus remove the active solids from the discharge water going into the creek. This basin was put into operation on July 3, 1944 and has effectively held the discharge activity to  $\frac{1}{2}$  to 1 curie per day with the average nearer  $\frac{1}{2}$  curie.

Analyses for the specific activities occurring in the pond precipitate indicated that the elements of most concern, barium, strontium, tellurium and cesium represent only a very small fraction of the total activity. J. G. Hamilton (letter to S. T. Cantrell, 6/20/44) estimates that on the basis of this composition a tolerance limit of 1 curie per day would probably be a safe rate of discharge to White Oak Creek. H. M. Parker (CH-1889) seems to think that this is conservative and that a tolerance limit of 5 curies might be permissible under certain conditions. This is about the average rate of discharge during the period of March 6 - April 27 when the active wastes were being added to the ponds.

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*M. D. Smith*